

REMEDIAL SITE ASSESSMENT DECISION - EPA REGION 1

Site Name: Carbolabs, Inc EPA ID#: CTD045175726

Alias Site Names: _____

City: Bethany County or Parish: _____ State: CT

Refer to Report Dated: 6-26-96 Report type: SIP

Report developed by: CDM-FPC/ARCS



SEMS DocID 642920

DECISION:

1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:

1a. Site does not qualify for further remedial site assessment under CERCLA (Site Evaluation Accomplished - SEA)

1b. Site may qualify for further action, but is deferred to:

RCRA
NRC

☒ 2. Further Assessment Needed Under CERCLA:

2a. (optional) Priority: ☐ Higher ☒ Lower

2b. Activity Type: ☐ PA ☐ SI ☒ ESI ☐ HRS evaluation
☐ Other: _____

DISCUSSION/RATIONALE:

Potential and past contamination of drinking water wells.
Contamination of surface water.
Comfort letter 11-14-00, coded as a "STATE LEAD SITE" 11-17-00

Report Reviewed and Approved by: Don S. Smith Signature: Don S. Smith Date: 7-2-96
Site Decision Made by: Don S. Smith Signature: Don S. Smith Date: 7-2-96

ARCS I
Final Site Inspection Prioritization Report
Carbolabs Inc.
Bethany, Connecticut

Prepared for
U.S. ENVIRONMENTAL PROTECTION AGENCY NEW ENGLAND
Office of Site Remediation and Restoration
Boston, MA

Work Assignment No.: 23-1JZZ
EPA Region: I
CERCLIS No.: CTD045175726
TDD No.: 9403-71-ACX
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**Final Site Inspection Prioritization Report
Carbolabs Inc.
Bethany, Connecticut**

**CERCLIS No. CTD045175726
TDD No. 9403-71-ACX
Work Assignment No. 23-1JZZ
Document No. 7710-023-FR-BVHN**

INTRODUCTION

The CDM Federal Programs Corporation (CDM Federal) Alternative Remedial Contracting Strategy (ARCS) team was requested by the U.S. Environmental Protection Agency New England (EPA-New England) Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the Carbolabs Inc. (Carbolabs) property in Bethany, Connecticut. Tasks were conducted in accordance with the ARCS Contract No. 68-W9-0045, the SIP scope of work dated September 3, 1992, and technical specifications provided by EPA under Work Assignment No. 23-1JZZ, which was issued to CDM Federal on September 22, 1992. A Preliminary Assessment (PA) was prepared by EPA on September 1981. On the basis of the information provided in the PA report, the Carbolabs Inc. Site Inspection was initiated. A Site Inspection (SI) report was prepared by NUS Corporation (NUS) on June 10, 1991. Updated information encountered during the SIP process is included in this report. Relevant text from the SI report is presented in this report in a smaller font.

Background information used in the generation of this report was obtained through file searches conducted at the Connecticut Department of Environmental Protection (CTDEP), telephone interviews with town officials, conversations with persons knowledgeable of the property, and conversations with other federal, state, and local agencies. Additional information was collected during the CDM Federal onsite reconnaissance on June 23, 1995 and environmental sampling on August 23, 1995.

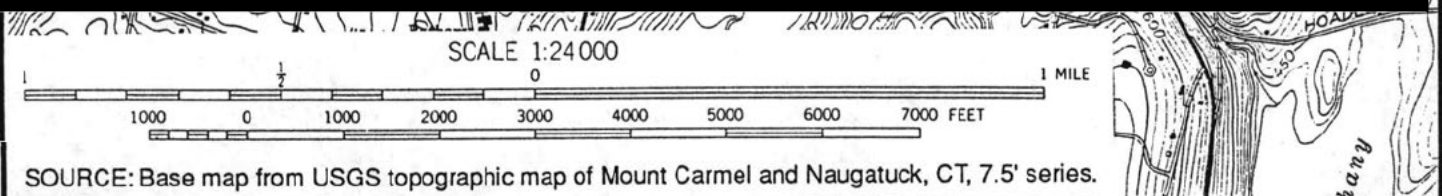
This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations, such as those under the Resource Conservation and Recovery Act (RCRA), or other federal, state, or local regulations. SIPs are intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

Carbolabs is an active facility located at 443 Fairwood Road in Bethany, New Haven County, Connecticut (Latitude 41° 26' 39" N, Longitude 72° 59' 26" W) [3,26,33]. Carbolabs manufactures organic chemicals that are used for experimental and research purposes and has been operating at this location since 1968 (see Figure 1: Location Map and Figure 2: Site Sketch) [3,26]. The property consists of 2.05 acres [26].

Four structures exist on the property: a main laboratory building, two chemical storage trailers, and a metal shed [3]. The trailer located nearest to the main laboratory building is used for the storage of raw hazardous chemicals, and the other trailer is used for hazardous waste storage [39]. Several

(b) (9)

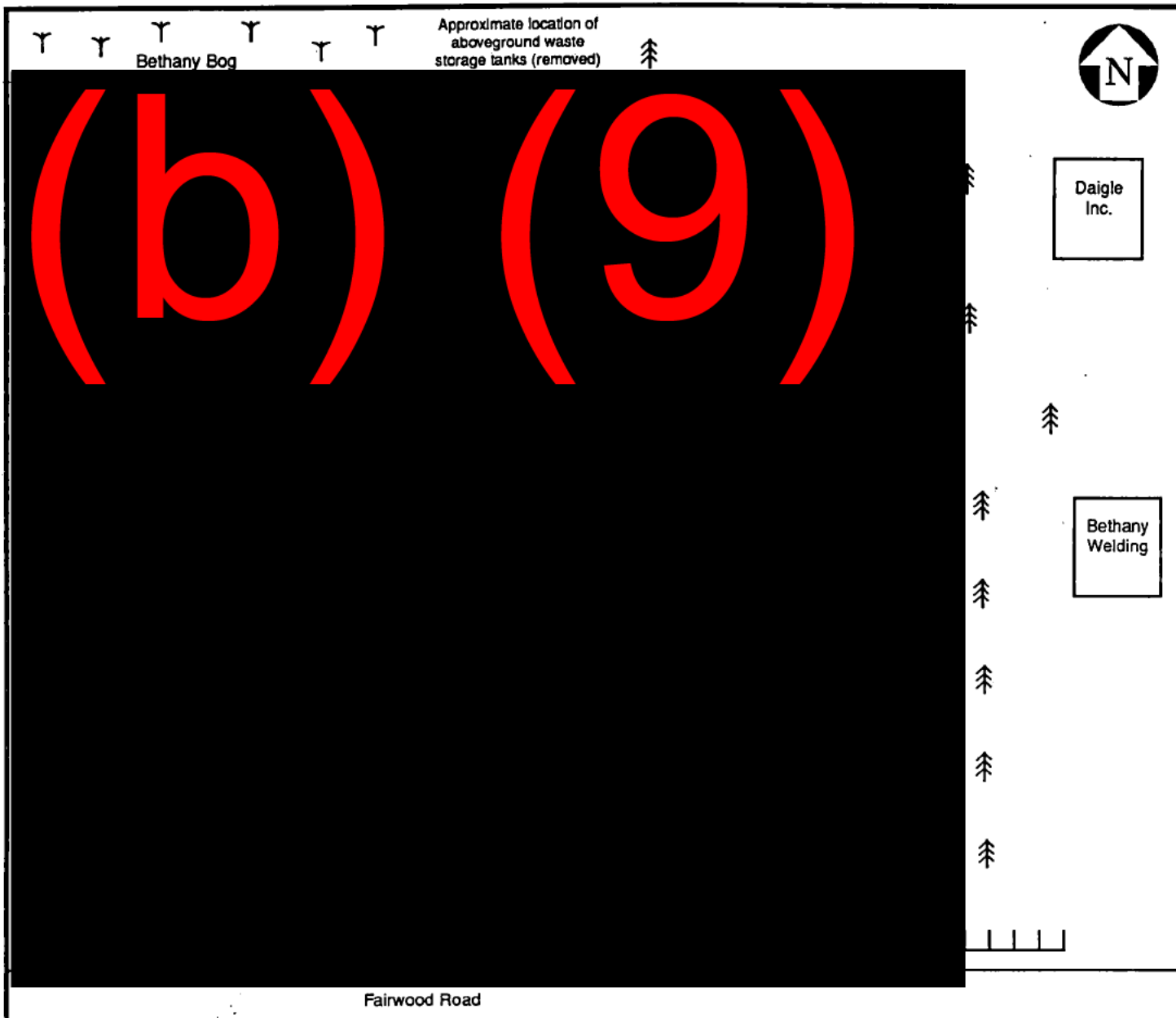


LOCATION MAP
CARBOLABS INC.
BETHANY, CONNECTICUT



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Figure 1



L E G E N D			
	Downslope direction		Grass
	Monitoring Well (Screened in overburden)		Wetland
	Water supply well		Paved area
	Forested area		Property boundary

Adapted from Final Screening Site Inspection, NUS Corporation, June 10, 1991.

NOT TO SCALE

SITE SKETCH
CARBOLABS INC.
BETHANY, CONNECTICUT



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Figure 2

empty 55-gallon drums are stored outside between the two trailers. The facility receives its water supply, including drinking water, from two private wells located on the property, (b) (9) of the main laboratory building. Two industries, Bethany Welding and Daigle Inc., are located to the east; a wooded area is located to the north; a wetland area (Bethany Bog) is located to the northwest and west; and private residences are located to the south across Fairwood Road [3].

Only two areas on the property are paved: a parking lot located to the east of the main building, which extends to the southeast and northeast of the building, and a long and narrow paved strip of land, which is located northeast and southeast of the main building [3]. Storm water flows to the northwest toward Bethany Bog [3,33]. Except for the southeastern portion of the property, the land is sloped downward to the north; the property to the southeast is sloped downward toward the west [3]. Local land use in the vicinity of Carbolabs is primarily residential [26].

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

According to the Town Tax Assessor, Ann Karabinos has been the Executive Director of the property since June 23, 1977. However, file information identifies Philip Pivawer as both owner and president of Carbolabs Inc. A 1989 Connecticut Department of Environmental Protection (CT DEP) inspection report lists Anne Karbinos [sic] and Phil Pibaner [sic] as property owners. Carbolabs Inc. has been operating at this location since 1968 [26].

Carbolabs Inc. manufactures "laboratory quantities of specialty organic chemicals". Isocyanates are the primary chemicals produced through the process of phosgenation. During the first step of this process, an amine is dissolved in ethyl acetate. Phosgene is then bubbled into this solution and reacts with the amine to form the isocyanate product. Following the formation of the isocyanate, the ethyl acetate solvent is boiled off and exhausted to an air-scrubber. The ratio of the final product is 10 parts isocyanate to 1 part ethyl acetate [26].

Spent ethyl acetate solvent was originally stored onsite in three 1,000-gallon aboveground tanks (some file information refers to these as three 3,000-gallon aboveground tanks). Carbolabs Inc. had stopped using these waste tanks by 1980...The empty storage tanks were removed between 1989 and 1990 [26].

The floors of the two hazardous chemical/waste storage trailers are wooden. No berms surround the drums/containers, which are situated directly on the wooden floor (no pallets are used) [39].

Carbolabs is a RCRA large quantity generator (ID No. CTD045175726) [39]. Currently, Carbolabs generates approximately 1,000 pounds of waste ethyl acetate per year. Drums of waste ethyl acetate and other chemical wastes, including 16-gallon labpacks, are temporarily stored in the hazardous waste storage trailer. The wastes are currently picked up by Clean Harbors, Inc. (EPA ID No. MAD053452637), a licensed hazardous waste transportation and disposal facility [3]. Carbolabs has used a hazardous waste transportation and disposal facility to remove and dispose of its hazardous wastes since at least 1979 [26].

A ventilated hazardous waste satellite storage area, consisting of two 55-gallon drums, currently exists on the first floor of the main laboratory building. This area is not bermed and consists of a concrete floor. One drum is used for chlorinated solvents and another drum for flammable solvents.

The drums are taken to the hazardous waste storage trailer approximately twice a week and replaced with empty drums. Small containers (5 to 15 gallons) of raw-material chemicals are used in the main building. Prior to their use, they are stored in the raw chemical storage trailer [39].

Non-hazardous scrubber saltwater generated from the phosgenation process is collected in a 3,000-gallon aboveground tank located in the main building. The tank is emptied approximately three times per year by pumping the water into a commercial vacuum truck and taking it offsite for disposal. Clean Harbors, Inc. is presently contracted to remove and dispose of the water from the tank [3]. The water from the sink in the laboratory, that is used to wash glasswear and equipment, empties into a cut-off 55-gallon drum. The water from the drum is pumped to the 3,000-gallon aboveground tank using a sump pump [39]. Wastewater from the bathroom and the sink in the lunch room drain into a septic tank located in the center of the property. The septic tank is at least 30 years old [3].

The following is a partial summary of events relating to Carbolabs, taken from the SI dated June 10, 1991 and prepared by NUS:

- 1976 - An Industrial Process Waste Mailer Questionnaire noted the following:
 - Waste hydrochloric acid (HCL) is "neutralized with caustic yielding salt and water." The neutralized HCL is "flushed" to the sewer [septic tank].
 - Waste ethyl acetate solvent is stored on site in storage tanks [26].
- October 19, 1979 - A sludge sample was collected from one of the three 1,000-gallon aboveground hazardous waste storage tanks by a sanitary engineer from the CT DEP [26].
- October 25, 1979 - The Connecticut Department of Health (CT DOH) conducted an investigation of the Carbolabs Inc. property. The inspection report stated that chemical waste was bottled, labeled, and placed in 55-gallon metal drums. When approximately ten 55-gallon drums had been accumulated, they were picked up by Newco of New York. "Junk material" was observed at the rear of the property during this inspection. The inspection report did not specify what this junk material consisted of. The CT DOH considered this to be "an improper storage, or disposal of refuse, and in violation of the Public Health Code Section 19-13-B21." The CT DOH inspectors concluded that there was no evidence of chemical waste being disposed of on the property. However, the CT DOH recommended that the "refuse and junk" be removed from the property [26].
- June 25, 1980 - Carbolabs Inc. was inspected by the CT DEP. The inspection report stated there is a "historical possibility of relatively small quantities of various chemicals being dumped on the ground out back in the past." The inspection report noted the following:
 - Approximately 1,000 pounds of neutralized waste HCL are generated per year. The waste HCL is neutralized in 20-gallon batches using 50 percent sodium hydroxide. The neutralized HCL is "dumped on the ground out back".
 - Carbolabs Inc. uses approximately 500 pounds of phosgene and 1,000 pounds of ethyl acetate a year.
 - Many small containers of "various chemicals (raw stock) are stored on site and 20 55-gallon drums of chloroform (raw stock) are stored on-site" [26].

- January 1983 - The CT DEP received a complaint from a neighbor who stated that Carbolabs Inc. "used to dispose of their chemicals in back of the place" approximately 3 or 4 years ago. The complainant did not know if the company was still disposing of chemicals in this same manner but requested that the soil be tested and water sample be collected from the Ansonia Water Company brook and from private wells in the area [26].
- June 29, 1983 - The CT DEP conducted an inspection of the Carbolabs Inc. property in response to the complaint filed in January. The CT DEP inspector did not observe any evidence of waste being disposed of on the property [26].
- March 1984 - A Preliminary Assessment conducted by the CT DEP recommended that no further action be conducted at the Carbolabs Inc. property [26].
- 1985 - Carbolabs Inc. installed a separate drum storage area. This new storage area enabled Carbolabs Inc. to stop storing drums outdoors, thereby reducing the chance of the drums leaking materials into the surrounding environment. Available file information did not document the location(s) where drums may have been stored outdoors prior to the installation of this separate drum storage area [26].
- September 1987 - During an inspection, the CT DEP identified two unpermitted discharges to the ground: "air-scrubber wastewater" and non-contact cooling water. The CT DEP reported that approximately 40 gallons of "air-scrubber wastewater" was being discharged to the drywell each month (since it was later discovered that there was no drywell on the property, this discharge was actually going to the septic tank). The "air-scrubber wastewater" was neutralized with HCL prior to being discharged. Reportedly, this wastewater contained "chlorides and any exhaust chemicals" collected by the air-scrubber during the phosgenation process [26].

Non-contact cooling water used in the vacuum distillation process was also being discharged to the drywell (septic tank) at a rate of approximately 2 gallons per minute. After boiling off the ethyl acetate, vacuum distillation was used to purify the isocyanate product. According to the CT DEP field inspector, this cooling water was "not likely to contain any contamination" [26].

As a result of this inspection, Carbolabs Inc. agreed to start collecting the "air-scrubber wastewater" and have it disposed of by their hazardous waste transporter. The CT DEP inspectors recommended that the CT DEP require that Carbolabs Inc. obtain a permit for their non-contact cooling water discharge. Available information does not indicate whether these corrective actions were carried out [26].

- June 19, 1989 - There was a fire at Carbolabs Inc. As a precaution, residents in the area were evacuated for the duration of the fire. Following the fire, Environmental Waste Resources, Inc. (EWR) was contracted to conduct the "emergency clean-up" of the property. As part of this "clean-up" effort, the CT DEP instructed EWR to do the following:
 - install monitoring wells
 - collect soil samples from the drywell
 - collect soil samples and excavate soils in areas exhibiting vegetative damage
 - collect air samples to determine when the building could be entered without respiratory protection
 - collect samples of wood and insulation damaged by the fire to determine the proper method(s) for their disposal [26].

The fire did not rupture any of the 55-gallon drums nor did it destroy the chemical storage area. Approximately 3,500 gallons of water were used to put out the fire. Reportedly, the majority of water used to fight the fire was held by a fire wall inside the building and recovered. Some of the standing water was vacuumed up by EWR and taken to their treatment/disposal facility. However, some water did seep into the ground near the building, and run-off reached the "swamp" located 50-75 yards behind the Carbolabs Inc. building. Following the fire, environmental samples were collected by the CT DEP and by EWR. EWR installed three monitoring wells on the north side of the laboratory building [26].

On June 19, 1989, the day of the fire, CTDEP collected two soil samples and a sample of standing water from the property. Information concerning the exact locations from which these samples were collected was not available. In June and July 1989, CTDEP collected 14 samples from private wells of residences in the area, one sample of private drinking water obtained from a spring, two samples of water from a neighbor's pool, a soil composite sample from a neighbor's yard, and one surface water sample from Bethany Bog, the wetland northwest of the property [26].

- Post June 19, 1989 - A 1,000-gallon underground fuel oil tank was removed under the supervision of EWR as a precautionary measure. The exact date of this removal is not documented in available file information. Reportedly, the tank was inspected after being excavated and it was determined that it had not been leaking. Following this removal, Carbolabs Inc. had an aboveground fuel oil tank installed [26].
- November 16, 1990 - NUS/FIT personnel conducted a site reconnaissance of the Carbolabs Inc. property [as part of the SI]. Due to the availability of recent sampling data, no samples were collected by NUS/FIT [26].

On August 28, 1991, in response to a burglar alarm at the Carbolabs main building, a State of Connecticut police trooper was overcome by a strong chemical odor upon entering the building. The trooper experienced mild side effects. No source of the odor was determined. The Oil and Chemical Response Division of CTDEP was notified of this incident [40].

On August 23, 1993, chloromethyl isocyanate was discharged into the atmosphere, resulting in an explosion. Four employees were taken to the local hospital as a result of the explosion. Shortly after the explosion, Clean Harbors of New Britain was brought on site to conduct air monitoring, the results of which were "not detected". The Oil and Chemical Response Division of CTDEP was notified of this incident [41].

On June 23, 1995, CDM Federal performed an onsite reconnaissance of the property as part of the SIP. At the time of the reconnaissance, 13 unlabeled drums were observed stacked against the north side of the main building [3].

On August 23, 1995, CDM Federal collected soil samples (both surface and subsurface) and sediment samples (from Bethany Bog) [3,4]. Samples were collected in accordance with the *Task Work Plan for Onsite Reconnaissance and Sampling at Carbolabs Inc.*, dated August 1995, and approved by EPA - New England, with exceptions noted in the trip report [4].

Analytical results were evaluated according to EPA Contract Laboratory Program (CLP) Tier II data validation protocols. Data quality objectives established for the sampling event were met. Details

of this sampling event are found in the Waste/Source Sampling and Surface Water Pathway sections of this report [3].

Table 1 presents identified structures or areas on the Carbolabs property that are potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

TABLE 1
Source Evaluation for
Carbolabs Inc.

Potential Source Area	Containment Factors	Spatial Location
Contaminated soil	None	North side of main building
Septic tank and leachfield	Soil cover	North of northeast corner of main building
Previously used drum storage area	Unknown	Unknown
Drum storage trailers	Enclosed, concrete floor and berm	North of main building
Raw material stored in non-drum containers	Concrete floor, sealed containers	In lab area and basement of main building
Three 1,000-gallon aboveground spent ethyl acetate solvent tanks	Unknown (the tanks have since been removed)	North of main building

[3,26]

Table 2 summarizes the types of potentially hazardous substances that have been disposed of, used, or stored on the property.

TABLE 2

**Hazardous Waste Quantity for
Carbolabs Inc.**

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Hydrochloric acid	Unknown	Unknown until 1976	Unknown until 1976	Septic tank
	1,000 pounds	1980	1980	The ground behind the main building
Ethyl acetate	Unknown	Prior to 1980	Prior to 1980	Three 1,000-gallon aboveground tanks
	Unknown	1980	1980	Unknown
	50 gallons	1982	1982	Unknown
	45 gallons	1983	1983	Unknown
Ethyl acetate and trace organics	50 gallons	1985	1985	Unknown
Acetone	200 gallons	1981	1981	Unknown
	100 gallons	1982	1982	Unknown
	150 gallons	1983	1983	Unknown
Acetone and trace organics	450 gallons	1985	1985	Unknown
Dichloromethane	20 gallons	1983	1983	Unknown
	500 pounds	1985	1985	Unknown
Trichlorobenzene	500 pounds	1985	1985	Unknown
THF, toluene, butyl mercaptan	80 pounds	1985	1985	Unknown
Waste corrosive solid lab packs, sodium fluoride, and residues of diethyl amine sulfur trifluoride	200 pounds	1985	1985	Unknown
Thionyl chloride	30 pounds	1986	1986	Unknown
Phosphorus oxychloride	20 pounds	1986	1986	Unknown

TABLE 2 (continued)

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Waste flammable liquid	600 gallons	1987	1987	Unknown
Waste lab solvent mixture	400 pounds	1987	1987	Unknown
Waste chlorinated solvents	400 pounds	1987	1987	Unknown
Sulfuric acid	90 pounds	1987	1987	Unknown
p-nitro phenol and bromo chloro propane	60 pounds	1987	1987	Unknown
Ethyl acetate	1,000 pounds	1994	1994	Drum storage trailers
Approximately 50 organic compounds	Approximately 1,500 gallons	Unknown until at least April 1995	Unknown	Drum storage trailers and main building
Hazardous waste (combined)	2,222 gallons (22,410 pounds)	1993/1994	1994	Drum storage trailers and main building

[1,2,26]

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) discovery date for Carbolabs is January 1, 1981. There are no CERCLA properties located within 1 mile of the property; however, Laticrete International (CTD001168343), a CERCLA property, is located within the town of Bethany [28]. Carbolabs is a RCRA large quantity generator [39]. RCRA notifiers located in the town of Bethany include AT&T Bethany Radio Station (CTD980521470), Colt Refining (CTD089622500), Nerpc, Inc. (CTD064841604), Uniroyal Chemical Company, Inc. (CTD000841312), and VSM Productions, Inc. and Amity Machine Productions (CTD001451442) [29].

WASTE/SOURCE SAMPLING

The following text in this section summarizes the sampling activities that occurred previously at the Carbolabs property:

In 1979, the CT DEP collected a sludge sample from one of Carbolabs Inc.'s 1,000-gallon aboveground waste storage tanks. Among the compounds and elements detected were hexane (> 140,000 micrograms per liter [$\mu\text{g/l}$]), either ethyl acetate or methyl ethyl ketone (> 34,000 $\mu\text{g/l}$), benzene (> 46,000 $\mu\text{g/l}$), toluene (> 51,000 $\mu\text{g/l}$), cyanide (280 milligrams per kilogram [mg/kg]), lead (230 mg/kg), and chromium (12 mg/kg) [26].

Table 3 shows the analytical results from a sludge sample collected by CTDEP in 1979 from one of the three 1,000-gallon aboveground waste storage tanks used for spent ethyl acetate. The sample was analyzed by an undocumented method.

TABLE 3

**Summary of Analytical Results
Sludge Sample Analysis for Carbolabs Inc.
Collected by CTDEP in 1979 from Aboveground Waste Storage Tank**

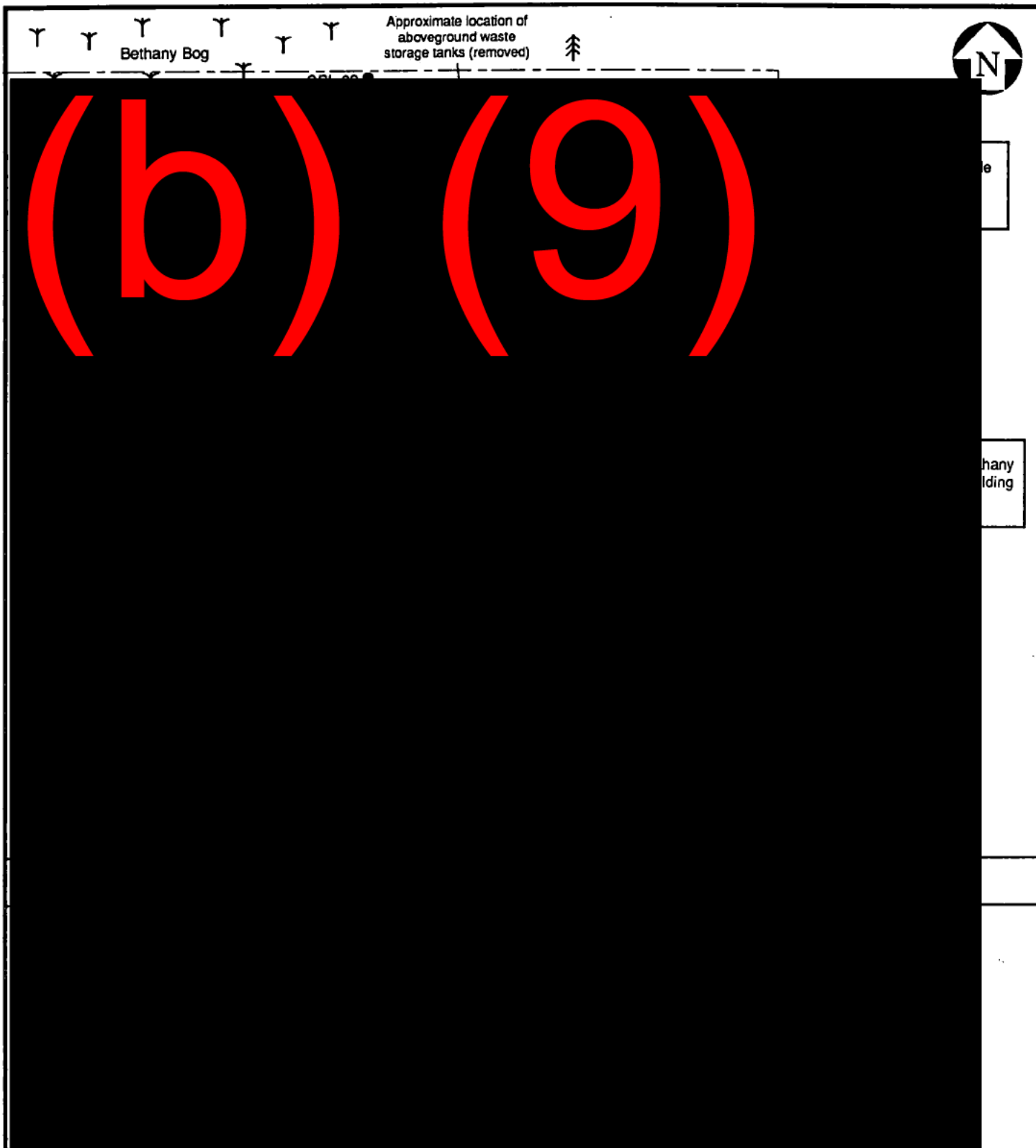
Compound/Analyte	Concentration
Hexane	>140,000 $\mu\text{g/l}$
Ethyl acetate or methyl ethyl ketone	> 34,000 $\mu\text{g/l}$
Benzene	> 46,000 $\mu\text{g/l}$
Toluene	>51,000 $\mu\text{g/l}$
Cyanide	280 mg/kg
Lead	230 mg/kg
Chromium	12 mg/kg

$\mu\text{g/l}$ = micrograms per liter.

mg/kg = milligrams per kilogram.

[26]

As part of the "emergency clean-up" [from the fire that occurred in 1989], EWR collected a total of 21 soil samples [over a 2-month period] and seven groundwater samples [from five locations] from the Carbolabs Inc. property...[see Figure 3: Site Sketch with EWR Soil Sampling Locations] [26]. On the day of the fire [June 19, 1989], EWR collected three samples. These samples are described in the text of the EWR report as being samples of "fire fighting water run-off" and in the sample inventory list as being "surficial soil" samples. These samples are referred to as sample numbers LK-01, LK-02, and LK-03 on the sample inventory list. However, on the analytical results data sheets these sample numbers are not used. Instead, the samples are referred to as #1, #2, and #3, respectively.



Adapted from Environmental Waste Resources, Inc. Sampling Report, October 1989.

NOT TO SCALE

(Collected
June & July
1989)

SITE SKETCH WITH EWR SOIL SAMPLING LOCATIONS

**CARBOLABS INC.
BETHANY, CONNECTICUT**



CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

Figure 3

These samples were analyzed for volatile organic compounds (Methods 8010, 8015, and 8020). Methylene chloride (dichloromethane) was the only compound detected in one sample at a concentration of 26.1 µg/l. The State of Connecticut Action Level for methylene chloride is 25 µg/l [26].

On June 20, 1989 (the day after the fire), EWR collected ten surficial soil samples from the property [these samples are part of the 21 soil samples mentioned in the previous paragraph]. These samples are referred to as sample numbers CBL-01 - CBL-09 and CBL-11 on the sample inventory list. However, on the analytical results data sheets [in the EWR Sampling Report] these samples are referred to as CL-01 - CL-09 and CL-11. All samples were analyzed for volatile organic compound (methods 8010, 8015, and 8020), cyanide, and EP-TOX metals. The only volatile organic compound detected was 1,2-dichlorobenzene (1.27 micrograms per gram [µg/gm]) at sample location CL-02. Lead is reported [in the EWR Sampling Report] as being detected at a concentration 0.55 milligrams per liter (mg/l) (sample number CL-02); however, the complete laboratory results indicate it was detected at a concentration of 0.05 mg/l. The State of Connecticut Health Standard for lead is 0.05 mg/l. Chromium (total) was also detected in this sample at a concentration of 0.66 mg/l; the State of Connecticut Health Standard is 0.05 mg/l [26].

On July 24, 1989, EWR excavated soil from an area on the north side of the building which exhibited vegetative damage. The excavated soil was stockpiled on the property in a "secure area." EWR collected four soil samples from the excavated area on July 24, 1989 (CBE-01 - CBE-04). Two samples of the stockpiled soil were collected on August 3, 1989 (CL-CS-C1, CL-CS-C2) [these samples are part of the 21 soil samples mentioned above]. All samples were analyzed for volatile organic compounds, cyanide, and EP-TOX metals. Cyanide and volatile organic compounds were not detected in any of these six samples. According to EWR, all metals detected were below the State of Connecticut Health Standards [26].

EWR also began to excavate the drywell area on July 24, 1989. During the excavation it was discovered that the drywell did not exist. Instead, the discharge pipe emptied into the septic tank. EWR dug a test pit at the boundary of the leaching field and collected a soil sample (CLDW-02). A split spoon soil sample (CBL-03-02) from the leaching field was also collected during the installation of MW CBL-03 [these samples are part of the 21 soil samples mentioned above]. According to EWR, only "background levels of barium, copper and zinc were detected" [26].

Table 4 shows the analytical results for the soil samples collected by EWR in June and July 1989. No reference sample was collected during this sampling event. The detection limits are also included on this table. Samples LK-01, LK-02, and LK-03 were analyzed for volatile organic compounds (VOCs) by EPA Methods 8010, 8015, and 8020. All other samples were analyzed for VOCs by EPA Methods 8010, 8015, and 8020; extraction procedure (EP) toxicity metals; and cyanide [12,26].

TABLE 4

Summary of Analytical Results
Source Soil Sample Analysis for Carbolabs Inc.
Collected by EWR in June and July 1989

Sample ID	Compound/Analyte Detected	Concentration	Detection Limit
LK-03	methylene chloride	26.1 µg/l*	1.0 µg/l*
CBL-01	barium	0.05 mg/l	0.02 mg/l
CBL-02	1,2-dichlorobenzene	1.27 µg/g	0.05 µg/g
	barium	0.09 mg/l	0.02 mg/l
	chromium	0.66 mg/l	0.02 mg/l
	lead	0.05 mg/l	0.002 mg/l
CBL-03	barium	0.05 mg/l	0.02 mg/l
CBL-05	barium	0.05 mg/l	0.02 mg/l
CBL-06	barium	0.33 mg/l	0.02 mg/l
CBL-07	barium	0.64 mg/l	0.02 mg/l
CBL-08	barium	0.26 mg/l	0.02 mg/l
CBL-09	barium	0.19 mg/l	0.02 mg/l
CBL-11	barium	0.12 mg/l	0.02 mg/l
CBE-01	barium	0.32 mg/l	0.02 mg/l
	copper	0.05 mg/l	0.02 mg/l
	zinc	0.42 mg/l	0.02 mg/l
CBE-02	barium	0.15 mg/l	0.02 mg/l
	zinc	0.09 mg/l	0.02 mg/l
CBE-03	barium	0.43 mg/l	0.02 mg/l
	copper	0.10 mg/l	0.02 mg/l
	zinc	0.55 mg/l	0.02 mg/l

TABLE 4 (continued)

Sample ID	Compound/Analyte Detected	Concentration	Detection Limit
CBE-04	barium	0.44 mg/l	0.02 mg/l
	copper	0.04 mg/l	0.02 mg/l
	zinc	0.63 mg/l	0.02 mg/l
CL-CS-C1	barium	0.38 mg/l	0.02 mg/l
	copper	0.10 mg/l	0.02 mg/l
	zinc	0.52 mg/l	0.02 mg/l
CL-CS-C2	barium	0.26 mg/l	0.02 mg/l
	zinc	0.52 mg/l	0.02 mg/l
CBL-03-02	barium	0.30 mg/l	0.02 mg/l
	zinc	0.09 mg/l	0.02 mg/l
CLDW-02	barium	0.54 mg/l	0.02 mg/l
	copper	0.09 mg/l	0.02 mg/l
	zinc	0.14 mg/l	0.02 mg/l

Notes: mg/l = milligrams per liter.
 µg/l = micrograms per liter.
 µg/g = micrograms per gram.

*Soil sample analytical results for VOCs such as methylene chloride are typically expressed in units of mg/kg or µg/kg. The units of µg/l, used in the table above for this compound, are taken directly from the laboratory report for this sampling round.

[12]

EWR installed three monitoring wells (MWs) on the north side of the Carbolabs Inc. building (CBL-01, CBL-02 and CBL-03) [in July 1989]. MW CBL-03 was installed "in the area of the septic system leaching trenches." The two wells located in front (south) of the laboratory building (CBL-E1, CBL-E2) supply Carbolabs Inc. with potable water. These two wells are located upgradient of the laboratory building. EWR collected groundwater samples from each of the five wells on July 31, 1989 [26].

The results of this sampling round can be found in the Groundwater Pathway section of this report. On July 13, 1989, EWR collected groundwater samples from two wells, CBL-E2 and CBL-01. The samples were analyzed for VOCs using EPA Methods 8010 and 8020. No compounds were detected in either sample; the detection limit was 1 µg/l [12].

On June 30, 1989, EWR collected two air samples from the building where the fire occurred to determine if the building could be entered without respiratory protection. One sample was collected with an air pump containing a charcoal tube, and the other was collected with a 3M organic vapor

monitor. Both samples were analyzed for VOCs only [12,26]. Refer to the Air Pathway section of this report for the analytical results of this sampling activity.

Also on June 19, 1989, the day of the fire, CTDEP collected two soil samples from the Carbolabs Inc. property. Information concerning the exact locations from which these samples were collected was not available [26]. Table 5 summarizes the analytical results for the two soil samples. Both samples were analyzed for metals and cyanide by an undocumented method. There are no sample identification numbers on any reports for these samples; therefore, one sample, which was observed to be yellow in color is referred to as the "yellow sample," and the second sample is referred to as the "other sample." The detection limits for these analytes were not available [12].

TABLE 5

**Summary of Analytical Results
Source Soil Sample Analysis for Carbolabs Inc.
Collected by CTDEP on June 19, 1989**

Analyte Detected	Concentration Detected in Other Sample (mg/kg)	Concentration Detected in Yellow Sample (mg/kg)
Aluminum	3,700	5,500
Cyanide	1.5	23
Cadmium	0.50	1.0
Chromium	4.8	11
Copper	20	60
Iron	11,000	10,000
Mercury	0.11	0.19
Nickel	7.0	8.3
Lead	19	60
Silver	8.00	0.25
Tin	7.8	3.0
Zinc	50	230

mg/kg = milligrams per kilogram
[26]

In June and July 1989, the CT DEP collected environmental samples from area near Carbolabs Inc. This sampling effort included the collection of one surface water sample from Bethany Bog (the wetland area northwest of Carbolabs Inc.), 14 samples from private wells of residents in the area, one sample of private drinking water obtained from a spring, two samples of water from a neighbor's pool, and a soil composite sample from a neighbor's yard [26].

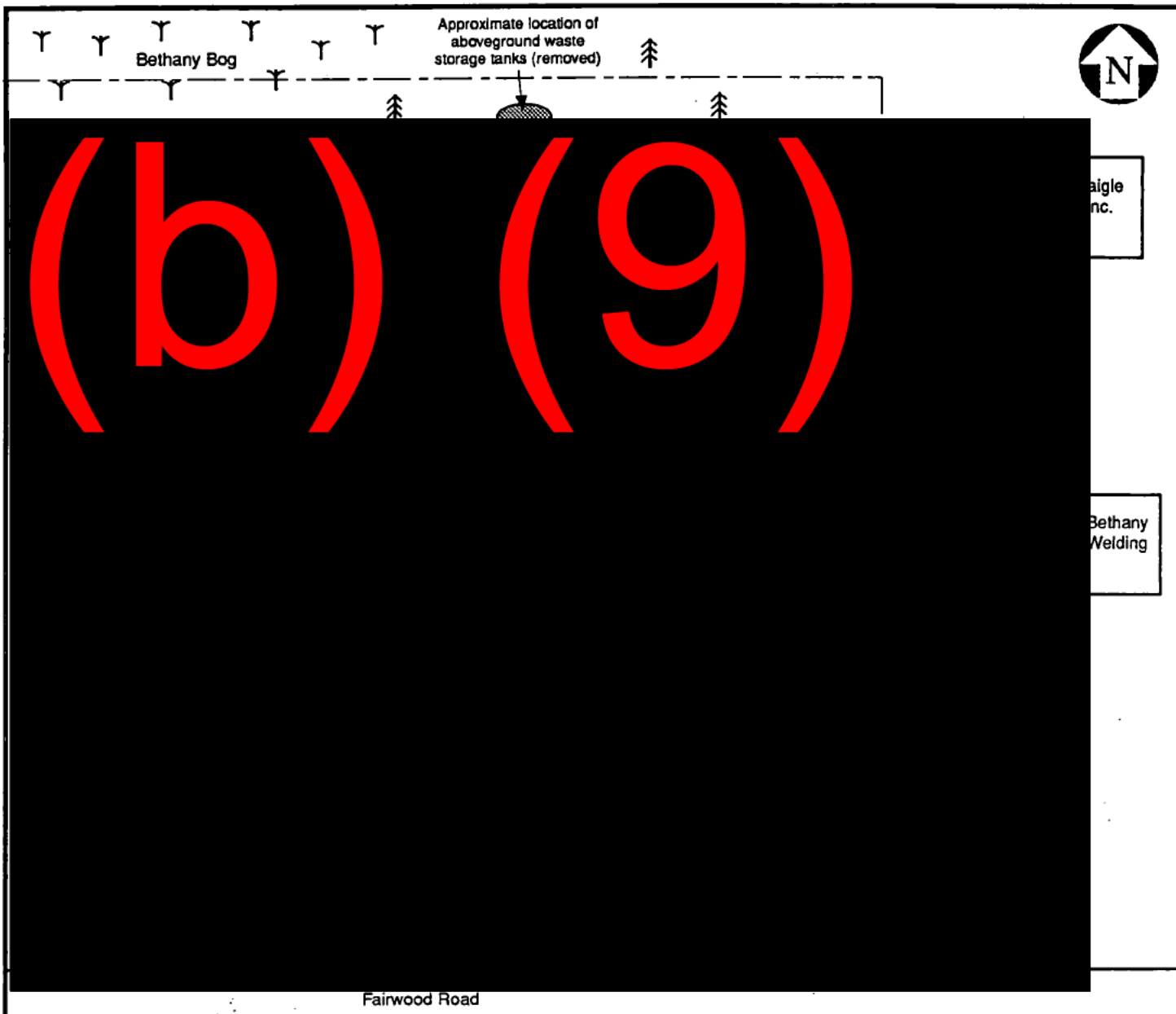
No compounds were detected in the surface water sample collected from Bethany Bog or the soil composite sample collected from a neighbor's yard [26]. See the Groundwater Pathway section of this report for compounds detected in the tap water samples.

On August 23, 1995, CDM Federal collected six surface and one subsurface soil samples at Carbolabs (see Figure 4: Site Sketch with CDM Federal Soil Sampling Locations) [3,4]. The Waste/Source Sample Summary for this sampling event is presented in Table 6. A reference soil sample (SS-01) was collected east of the parking lot in the eastern portion of the property at a location presumed to be unaffected by onsite contaminants. All waste/source samples were submitted for the analysis of full Target Compound List (TCL) organic compounds and the analysis of full Target Analyte List (TAL) inorganic analytes through EPA CLP Routine Analytical Services (RAS).

TABLE 6

**Waste/Source Sample Summary: Carbolabs Inc.
Samples Collected by CDM Federal on August 23, 1995**

Sample Location No.	Traffic Report No.	Time	Remarks	Sample Source
MATRIX: Soil				
SS-01	AKP12 (O) MAHT90 (I)	1015	Grab, 0 - 8"	Background sample collected 9 feet from eastern edge of parking lot and 26 feet from northeastern corner of parking lot
SS-02	AKP13 (O) MAHT91 (I)	1250	Grab, 0 - 8"	Sample collected 39 feet from north side of building and 1 foot from the northern edge of the paved walkway
SS-03	AKP14 (O) MAHT92 (I)	1250	Grab, 0 - 8"	Field duplicate of SS-02 for quality control
SS-04	AKP15 (O) MAHT93 (I)	1440	Grab, 0 - 6"	Sample collected between the two chemical storage trailers, 5 feet from the paved walkway; MS/MSD sample
SS-05	AKP16 (O) MAHT94 (I)	1340	Grab, 0 - 6"	Sample collected 5.5 feet from north side of building and 4 feet from western edge of paved walkway
SS-06	AKP17 (O) MAHT95 (I)	1350	Grab, 0 - 6"	Sample collected 4 feet from north side of building and 7.5 feet from eastern edge of paved walkway
SB-01	AKP18 (O) MAHT96 (I)	1040	Grab, 2.5'	Soil boring sample collected 27 feet from Fairwood Road and 14 feet from the driveway/parking lot



L E G E N D			
	Downslope Direction		Grass
	Monitoring Well (Screened in overburden)		Wetland
	Water supply well		Paved Area
	Forested Area		Soil sample location
			Property boundary

Adapted from Final Screening Site Inspection, NUS Corporation, June 10, 1991.

NOT TO SCALE

SITE SKETCH WITH CDM FEDERAL SOIL SAMPLING LOCATIONS

**CARBOLABS INC.
BETHANY, CONNECTICUT**



CDM FEDERAL PROGRAMS CORPORATION
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Figure 4

TABLE 6 (continued)

Sample Location No.	Traffic Report No.	Time	Remarks	Sample Source
EB-SS	AKP26 (O) MAHW04 (I)	0900	Grab	Equipment blank collected in the parking lot area
TB-01	AKP27 (O)	0825	Grab	Trip blank collected in parking lot area; for RAS analysis

RAS = Routine Analytical Services.
 MS/MSD = Matrix Spike/Matrix Spike Duplicate.
 I = Inorganic (RAS metals and cyanide analyses).
 O = Organic (RAS volatile organic, semivolatile organic, and pesticides/polychlorinated biphenyls only).
 [3,4]

Table 7 presents a summary of compounds and analytes detected through CLP analysis of waste/source (soil) samples. Details of the sediment sampling analysis for this sampling event can be found in the Surface Water Pathway section of this report. For each sample location, a compound or analyte is listed if it has been detected at three or more times the reference sample concentration. Compounds or analytes that occur at a concentration equal to or greater than three times the reference concentration (sample location SS-01) are designated by their approximate relative concentration above the reference concentration. If the compound or analyte is not detected in the reference sample, the sample quantitation limit (SQL) (for organic analysis) or sample detection limit (SDL) (for inorganic analysis) is used as the reference value. Accordingly, a compound or analyte is listed by the concentration above its SQL or SDL only if it occurs at a value equal to or greater than the corresponding SQL or SDL in the reference sample.

Sample results qualified with a "J" in the analytical results tables are considered approximate because of limitations identified during CLP data validation. Organic sample results reported at concentrations below quantitation limits and confirmed by mass spectroscopy are also considered approximate and are qualified by a "J". The complete analytical results of CDM Federal sampling activities, including SQLs and SDLs, are presented in Attachment A (organic results) and Attachment B (inorganic results).

TABLE 7

**Summary of Analytical Results
Waste/Source Sample Analysis for Carbolabs Inc.
Collected by CDM Federal on August 23, 1995**

Sample Location No.	Compound/Analyte	Concentration (mg/kg)	Reference Concentration (mg/kg)	Comments
SS-05	Calcium	2,070	325	6.37 x REF
	Mercury	1.50 J	0.10 U	15 x SDL
SS-06	Calcium	1,310	325	4.03 x REF
	Copper	52.7	14.9	3.54 x REF
	Lead	31.9	7.6	4.20 x REF
	Mercury	0.33 J	0.10 U	3.3 x SDL
	Zinc	756 J	36.1 J	20.9 x REF

J = Quantitation approximate due to limitations identified in quality control review.

mg/kg = Milligrams per kilogram (equivalent to parts per million or ppm).

REF = Reference concentration.

SDL = Sample detection limit.

U = Indicates the sample was analyzed for but not detected and reports the detection value.

Note: The precision of the entries in the "Comments" column is governed by the rules of significant digits.
[5,6]

Calcium, copper, lead, and zinc were detected in one soil sample and mercury was detected in two soil samples collected by CDM Federal at concentrations at least three times above the reference concentration [5,6]. It is not known if these analytes were used or generated at the Carbolabs facility. However, lead was detected at an elevated concentration from a sludge sample taken from an aboveground storage tank in 1979 [26]. Lead, copper, and zinc were each detected in at least one of the 21 soil samples collected by EWR in 1989 [12]. Copper, lead, mercury, and zinc were detected in two soil samples collected by CTDEP in 1989 [26].

GROUNDWATER PATHWAY

Surficial materials in the area are comprised of till. The average thickness of this till is approximately 10-20 feet. Bedrock consists of "coarse-to-medium grained, well-lineated, well-foliated grandodiorite gneiss". The depth to bedrock in the area ranges from 0 to 50 feet [26,27].

The groundwater in the area of Carbolabs Inc. forms the "headwaters of Hockanum Brook" and is classified as GA. Under this classification, the designated use is for "existing private and potential water supply". Groundwater flow in the area is generally to the northwest toward a wetland area located between 50 and 75 yards from the Carbolabs Inc. building. The depth to the water table ranges from 10.4 feet at monitoring well CBL-03 to 24.98 feet at CBL-E2 [26].

The nearest private wells are two wells located on the Carbolabs property, approximately (b) (9) feet in front of or south of the main laboratory building. These wells are referred to as CBL-E1 and CBL-E2, respectively, and are screened in bedrock at depths of 350 and 500 feet, respectively [3,26]. CBL-E1 was taken out of service approximately 20 years ago because it was a poor producer, and since that time all the water supply for Carbolabs has been provided by CBL-E2. [3,42]. All residences in the town of Bethany are served by private wells [23].

Four public drinking water supply systems are located within 4 miles of Carbolabs. The nearest of these systems are the Gendron Valley Mobile Park well system and the Mark's Brook well system, both located (b) (9) of the property [10,16,26]. The Gendron Valley Mobile Park well system consists of two blended wells, each approximately 20 feet deep, which serve an estimated 100 people [16]. The Mark's Brook well system is supplied by the Connecticut Water Company, Naugatuck Division, and consists of two blended, gravel packed wells, at depths of 55 and 77 feet, which serve an estimated 932 people [18,19,20,26]. Harmony Acres Mobile Home Park well system also consists of two wells and serves an estimated 396 people [26]. The Indian Field well system, supplied by the Connecticut Water Company, Naugatuck Division, consists of two blended, gravel packed wells, at depths of 65 feet, and serve an estimated 2,422 people [17,18,26].

Approximately 11,097 people are served by private groundwater drinking sources and an estimated 14,947 people are served by private and public groundwater drinking sources within 4 miles of the Carbolabs property [13,16,17,18,19,20]. There are no wellhead protection areas currently designated in Connecticut [11]. Table 8 lists the public groundwater sources within 4 miles of Carbolabs.

TABLE 8**Public Groundwater Supply Sources within 4 Miles of
Carbolabs Inc.**

Distance/ Direction from Property	Source Name	Location of Source (Town)	Estimated Population Served	Source Type*
(b) (9)	Gendron Valley Mobile Park Wells #1 and #2	Naugatuck	100	Overburden
	Mark's Brook Wells #1 and #2	Naugatuck	932	Overburden
	Indian Field Well #1	Naugatuck	1,211*	Overburden
	Harmony Acres Mobile Home Park Wells #1 and #2	Naugatuck	396	Overburden
	Indian Field Well #2	Naugatuck	1,211*	Overburden

*Overburden, Bedrock, or Unknown

*Numbers are rounded

[10,13,16,17,18,19,20]

Table 9 lists the populations that receive drinking water from public and private sources located within each of the target distance rings. Frost Associates estimated the population served by private wells by summing the total number of drilled and dug wells within each CENTRACTS block (a Cartesian data management system used by the Census Bureau) and multiplying this total by the average number of people in each household [13].

TABLE 9**Estimated Drinking Water Populations Served by Groundwater Sources
within 4 Miles of Carbolabs Inc.**

Radial Distance From Carbolabs (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 - 0.25	61	0	61
> 0.25 - 0.50	173	0	173
> 0.50 - 1.00	741	0	741
> 1.00 - 2.00	1,503	1,032	2,535
> 2.00 - 3.00	3,778	1,211	4,989
> 3.00 - 4.00	4,841	1,607	6,448
TOTAL	11,097	3,850	14,947

[13,16,17,18,19,20]

As part of the emergency cleanup from the fire that occurred at the property on June 19, 1989, EWR installed three overburden monitoring wells on the property on July 11, 12, and 13, 1989. The wells are referred to as CBL-01, CBL-02, and CBL-03. Each well was dug to a depth of 30 feet [26].

On July 13, 1989, EWR collected groundwater samples from two wells, CBL-E2 and CBL-01 (see Figure 2: Site Sketch). The samples were analyzed for VOCs using EPA Methods 8010 and 8020. No compounds were detected in either sample, the detection limit being 1 µg/l [12].

EWR collected groundwater samples from each of the five wells [the two drinking water and three monitoring wells] on July 31, 1989 [see Figure 2: Site Sketch]. These samples were analyzed for volatile organic compounds (Methods 8010, 8015 and 8020), cyanide, and EP-TOX metals. Lead was detected in one well (CBL-03) at a concentration of 0.18 mg/l which is above the State of Connecticut Health Standard of 0.05 mg/l. According to EWR, the detection of lead at this concentration is "not consistent with site activities or soil sampling results". However, it should be noted that lead was detected in the 1979 sludge sample at a concentration of 230 mg/kg. Volatile organic compounds [were detected in CBL-01 and CBL-02 but] were not detected in monitoring wells CBL-E1, CBL-E2 and CBL-03. The following volatile organic compounds were detected in MW CBL-02: methyl isobutyl ketone (2,400 µg/l); 1,2-dichloroethane (16 µg/l); benzene (3.2 µg/l which exceeds the State of Connecticut Health Standard of 1.0 µg/l); xylenes (1.4 µg/l); and toluene (1.0 µg/l). Tetrachloroethylene was detected in MW CBL-01 at a concentration of 2.0 µg/l. The detection of all these volatile organic compounds except tetrachloroethylene [and methyl isobutyl ketone] is consistent with those compounds detected in the 1979 sludge sample and/or documented as having been used by Carbolabs Inc. [26].

Table 10 provides a summary of the compounds/analytes detected in groundwater samples collected by EWR on July 31, 1989.

TABLE 10
Summary of Analytical Results
Groundwater Sample Analysis for Carbolabs Inc.
Collected by EWR on July 31, 1989

Sample ID	Compound/Analyte Detected	Concentration	Detection Limit
CBL-01	Tetrachloroethylene	2.0 µg/l	1.0 µg/l
	Barium	0.11 mg/l	0.02 mg/l
	Copper	0.16 mg/l	0.02 mg/l
	Zinc	0.09 mg/l	0.02 mg/l
CBL-02	Benzene	3.2 µg/l	1.0 µg/l
	1,2-Dichloroethane	16.0 µg/l	1.0 µg/l
	Methyl isobutyl ketone	2,400 µg/l	1.0 µg/l
	Toluene	1.0 µg/l	1.0 µg/l
	Xylenes	1.4 µg/l	1.0 µg/l
	Barium	0.05 mg/l	0.02 mg/l
CBL-03	Barium	0.07 mg/l	0.02 mg/l
	Lead	0.18 mg/l	0.02 mg/l
	Zinc	0.10 mg/l	0.02 mg/l
CBL-E1	Barium	0.07 mg/l	0.02 mg/l
	Copper	0.03 mg/l	0.02 mg/l
	Zinc	0.06 mg/l	0.02 mg/l
CBL-E2	Barium	0.08 mg/l	0.02 mg/l
	Zinc	0.06 mg/l	0.02 mg/l

µg/l = micrograms per liter.

mg/l = milligrams per liter.

[12]

Lead was detected in a sludge sample collected from an aboveground storage tank by CTDEP in 1979 [26]. Copper, lead, and zinc were detected in at least one source sample collected by EWR in 1989 and CDM Federal in 1995 [5,6,12,26]. Benzene, 1,2-dichloroethane, toluene, and xylene are used in the laboratory at the facility [1]. It is not known if tetrachloroethylene, methyl isobutyl ketone, or barium were used or generated at the facility.

In June and July 1989, the CT DEP collected environmental samples from areas near Carbolabs Inc. This sampling effort included the collection of one surface water sample from Bethany Bog (the wetland area northwest of Carbolabs Inc.), 14 samples from private wells of residents in the area, one sample of private drinking water obtained from a spring, two samples of water from a neighbor's pool, and a soil composite sample from a neighbor's yard. Although the street addresses for the homes from which private drinking water samples were collected are listed on the analytical data sheets, the exact locations of these homes in relation to the Carbolabs Inc. property could not be determined for this report. All samples were analyzed for organohalides using either a flame ionization detector or a gas chromatograph. The organohalide detection limit for these analyses was 1.0 µg/l. Tetrachloroethylene was detected in one private well sample at a concentration of 1 µg/l. Chloroform was detected at a concentration of 730 µg/l in one of the pool water samples. Carbon tetrachloride, 1,1,1-trichloroethane (1,1,1 TCE), trichloroethylene, and tetrachloroethylene were reported as being detected at concentrations <1 µg/l in several private well samples [26].

Table 11 provides a summary of the compounds detected from the June and July 1989 CTDEP sampling event.

TABLE 11

**Summary of Analytical Results
Swimming Pool and Tap Water Sample Analysis for Carbolabs Inc.
Collected by CTDEP in June and July 1989**

Sample Type	Sample ID	Compounds Detected	Concentration
Swimming pool	Sormon residence	Chloroform	730 µg/l
Spring (tap water)	Caltha Crowe 932 O. Litchfield	Tetrachloroethylene	<1.0 µg/l
		1,1,1-trichloroethylene	<1.0 µg/l
Tap water	Daigle, Inc. 797 Amity Road	Tetrachloroethylene	<1.0 µg/l
		1,1,1-trichloroethylene	<1.0 µg/l
Tap water	Vollaro 403 Fairwood Road	Carbon tetrachloride	<1.0 µg/l
Tap water	Residence located at 421 Fairwood Road	Carbon tetrachloride	<1.0 µg/l
Tap water	William Velub 15 Munson Road	Tetrachloroethylene	<1.0 µg/l
		1,1,1-trichloroethylene	<1.0 µg/l
		Trichloroethylene	<1.0 µg/l
Tap water	Verub Bros. Greehouse 15 Munson Road	Tetrachloroethylene	1.0 µg/l

µg/l = micrograms per liter
[26]

None of the above-detected compounds were found in any source samples on the property [5,6,12,26]. It is not known if any of the above compounds were used or generated at the facility.

SURFACE WATER PATHWAY

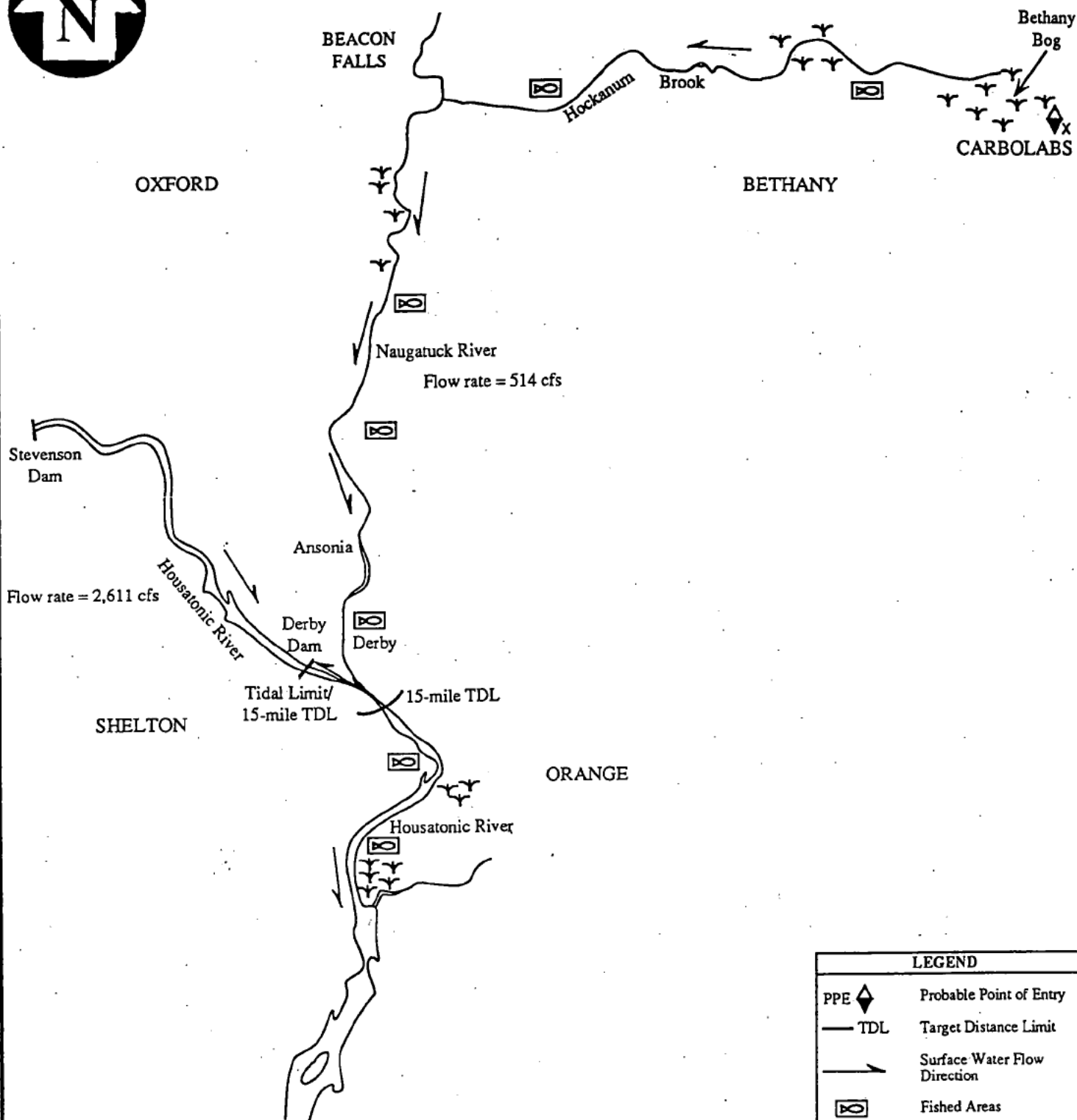
The regional surface topography consists of north/south trending resistant rock ridges and valleys, as well as glacially produced north/south oriented hummock-like terrain. A surface water drainage divide is located in the southeastern portion of the Carbolabs property. At the eastern edge of the property, surface water appears to drain to the north; at the southern edge of the property, surface water appears to drain to the east. For the remainder of the property, surface water appears to flow northwest toward Bethany Bog, a 55-acre wetland, which is also the probable point of entry (PPE) [33].

The Carbolabs property, which is not in a floodplain, slopes to the northwest approximately 500 feet to the PPE [25,33,34]. Bethany Bog drains to the northwest into Hockanum Brook (See Figure 5: Surface Water Pathway) [26,34,35]. The state surface water classification for Hockanum Brook for the first 3 miles from Bethany Bog is Class A, which is suitable for existing or potential public drinking water supply, fish and wildlife habitat, and recreational uses. Beyond this point, Hockanum Brook is Class B/A, until it flows into Naugatuck River approximately 3 miles downstream from Bethany Brook [9,34,35]. The Naugatuck River is Class C/B, which is reflective of existing water quality problems and can have existing uses that include certain fish and wildlife habitats, certain recreational activities, agricultural use, and industrial and other legitimate uses [9]. The flow rate of the Naugatuck River through Beacon Falls is 514 cubic feet per second (cfs) [37]. The Naugatuck River joins the Housatonic River approximately 13.5 miles downstream from the property [35].

The 15-mile downstream mark from the Carbolabs property is on the Housatonic River just below Twomile Island [35]. Tidal effects extend approximately 1 mile up the Housatonic River from the end point of the 15-mile surface water pathway [22]. The flow rate of the Housatonic River is 2,611 cfs [37]. The Housatonic River, with a surface water classification of SC/SB, is used for recreational purposes, including boating, swimming and fishing [26]. Class SC is reflective of coastal waters with existing water quality problems. Class SC waters can be used for marine fish, shellfish, and wildlife habitats, and for recreational boating, industrial, and other legitimate purposes, including navigation and swimming; one or more of these uses, however, may be impaired or precluded because of pollution [9]. There are no drinking water intakes or sensitive environments along the Carbolabs 15-mile surface water pathway [10,16,17,19,20,21,24].

Hockanum Brook is a fishery that contains brook trout. The Naugatuck and Housatonic Rivers are both fished extensively. The Naugatuck River, in addition to being stocked with trout and salmon, contains American shad, blueback herring, alewife, eel, white perch, striped bass, and yellow perch [14]. The Housatonic River also contains the same fish as the Naugatuck River but is not stocked with fish. In addition, short-nose sturgeon, a federally listed endangered species, periodically appears in the lower section of the Naugatuck River [15].

Approximately 4.1 miles of wetland frontage exist along the surface water pathway: 2 miles along Bethany Bog, 1.4 miles along Hockanum Brook, 0.3 mile along the Naugatuck River, and 0.4 mile



LEGEND	
PPE	Probable Point of Entry
TDL	Target Distance Limit
	Surface Water Flow Direction
	Fished Areas
	Wetlands
cfs	Cubic Feet per Second

NOT TO SCALE

Adapted from U.S.G.S. topographic map of Bridgeport, Connecticut Quadrangle, 30 x 60 minute series, 1986.

SURFACE WATER PATHWAY CARBOLABS, INC BETHANY, CONNECTICUT



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Figure 5

along the Housatonic River [30,31,32]. Table 12 lists the water bodies within the surface water segment of Carbolabs and provides the length of reach, flow characteristics, and length of wetlands.

TABLE 12
Water Bodies within the Surface Water Segment of
Carbolabs Inc.

Surface Water Body	Descriptor ^a	Length of Reach	Flow Characteristics (cfs) ^b	Length of Wetlands
Bethany Bog	minimal stream	1 mile	< 10 cfs	2 miles
Hockanum Brook	small to moderate stream	3 miles	between 10 and 100 cfs	1.4 miles
Naugatuck River	moderate to large stream	9.5 miles	514 cfs	0.3 mile
Housatonic River	large stream to river	1.5 miles	2,611 cfs	0.4 mile

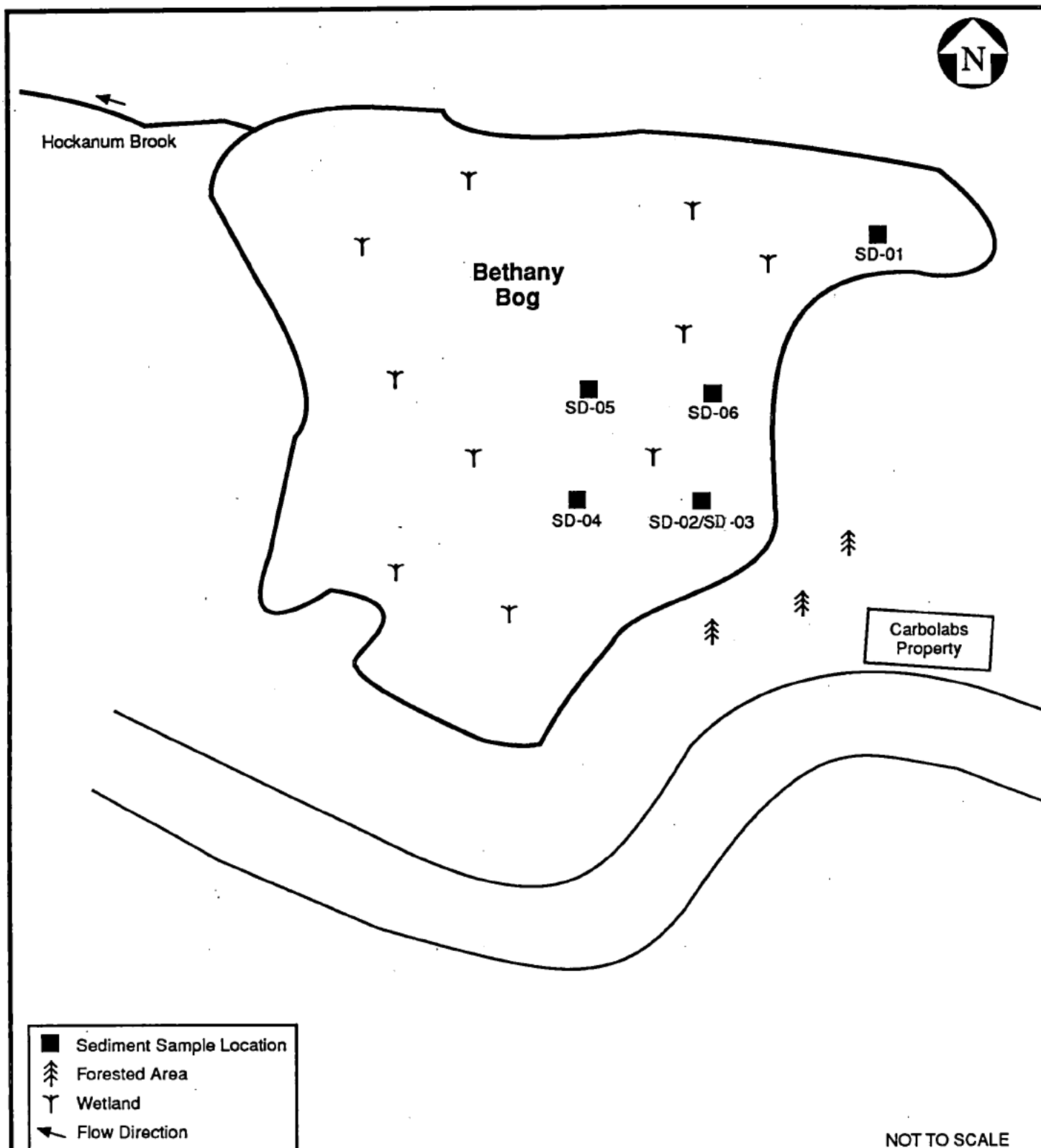
^a Minimal stream. Small to moderate stream. Moderate to large stream. Large stream to river. Very large river. Coastal tidal waters. Shallow ocean zone or Great Lake. Deep ocean zone or Great Lake. Three-mile mixing zone in quiet flowing river.

^b Cubic feet per second.
[26,30,31,32,35,36,37]

In June and July 1989, the CT DEP collected environmental samples from areas near Carbolabs Inc. This sampling effort included the collection of one surface water sample from Bethany Bog (the wetland area northwest of Carbolabs Inc.)...All samples were analyzed for organohalides using either a flame ionization detector or a gas chromatograph. The organohalide detection limit for these analyses was 1.0 µg/l [26].

No compounds were detected in this surface water sample collected by CTDEP from Bethany Bog [26].

On August 23, 1995, CDM Federal collected seven sediment samples from the nearby wetland, Bethany Bog (see Figure 5: CDM Federal Sediment Sampling Locations). A sample summary for the sediment samples collected by CDM Federal is presented in Table 13. A reference sample, SD-01, was collected from the northeast corner of Bethany Bog at a location presumed to be unaffected by onsite contaminants. All sediment samples were submitted for the analysis of TCL VOCs and TAL metals through CDM Federal's Delivery of Analytical Services (DAS) because of the possibility that the samples would contain less than 30 percent solids. At CDM Federal's request, the laboratory air dried samples and analyzed them for mercury and silver in samples where these results were rejected due to low percent solids and EPA CLP Region I data validation.



CDM FEDERAL SEDIMENT SAMPLING LOCATIONS

**CARBOLABS INC.
BETHANY, CONNECTICUT**



CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

Figure 6

requirements [3,4]. For SD-01, SD-04, SD-05, and SD-06, mercury was analyzed outside of its holding time of 28 days, and the results are therefore considered to be biased low. SVOCs, P/PCBs, and cyanide were analyzed through EPA CLP RAS [6,7,8].

TABLE 13

**Sediment Sample Summary: Carbolabs Inc.
Samples Collected by CDM Federal on August 23, 1995**

Sample Location No.	Traffic Report No.	Time	Remarks	Sample Source
MATRIX: Sediment				
SD-01	AKP20 (O)* MAHT98 (I) DAC814 (D)	1030	Grab, 0 - 18"	Background sample collected approximately 200 feet north-northeast of SD-06 in the northeastern section of the wetland
SD-02	AKP21 (O)* MAHT99 (I) DAC815 (D)	1500	Grab, 0 - 10"	Sample collected approximately 450 feet northwest of the laboratory building and 50 feet north of the beginning of the wetland
SD-03	AKP22 (O)* MAHW00 (I) DAC816 (D)	1500	Grab, 0 - 10"	Field duplicate of SD-02 for quality control
SD-04	AKP23 (O)* MAHW01 (I) DAC817 (D)	1330	Grab, 0 - 10"	Sample collected approximately 150 feet northwest of SD-02 and SD-03
SD-05	AKP24 (O)* MAHW02 (I) DAC818 (D)	1300	Grab, 0 - 15"	Sample collected approximately 100 feet north-northwest of SD-04
SD-06	AKP25 (O)* MAHW03 (I) DAC819 (D)	1115	Grab, 0 - 15"	Sample collected approximately 200 feet north of SD-02/SD-03 and 100 feet east of SD-05
TB-02	DAC820 (V)	0830	Grab	Trip blank collected in the parking lot area for DAS analysis

D = DAS (DAS metals and volatile organic analyses).
DAS = Delivery of Analytical Services.
I = Inorganic (RAS metals and cyanide analyses).
O = Organic (RAS volatile organic, semivolatile organic, and P/PCB only).
P/PCB = Pesticides/polychlorinated biphenyl compounds.
V = DAS (DAS volatile organic analysis).
* = Samples were analyzed via RAS for semivolatile organics and P/PCB only.

[3,4]

Table 14 presents a summary of compounds and analytes detected through CLP analysis of sediment samples. For each sample location, a compound or analyte is listed if it has been detected at three or more times the reference sample concentration. Compounds or analytes that occur at a concentration equal to or greater than three times the reference concentration (sample location SD-01) are designated by their approximate relative concentration above the reference concentration. If the compound or analyte is not detected in the reference sample, the SQL (for organic analysis) or SDL (for inorganic analysis) is used as the reference value. Accordingly, a compound or analyte is listed by the concentration above its SQL or SDL only if it occurs at a value equal to or greater than the corresponding SQL or SDL in the reference sample.

Sample results qualified with a "J" in the analytical results tables are considered approximate because of limitations identified during CLP data validation. Organic sample results reported at concentrations below quantitation limits and confirmed by mass spectroscopy are also considered approximate and are qualified by a "J". The complete analytical results of CDM Federal sediment sampling activities, including sample quantitation and sample detection limits, are presented in Attachment A (SVOC results), Attachment C (VOC, pesticide/PCB results), and Attachment D (inorganic results).

TABLE 14

**Summary of Analytical Results
Sediment Sample Analysis for Carbolabs Inc.
Collected by CDM Federal on August 23, 1995**

Sample Location No.	Compound/ Analyte	Concentration	Reference Concentration	Comments
SD-02 (dup of SD-03)	Mercury	0.24 J mg/kg	0.22 UJ mg/kg	1.1 x SDL
SD-04	4,4'-DDD	26 J µg/kg	22 UJ µg/kg	1.2 x SQL
	Mercury	0.28 J mg/kg	0.22 UJ mg/kg	1.3 x SDL
SD-06	Chromium	22.0 J mg/kg	6.7 J mg/kg	3.4 x REF

J = Quantitation approximate due to limitations identified in quality control review.

mg/kg = Milligrams per kilogram (equivalent to parts per million or ppm).

NA = The data were not available.

REF = Reference concentration.

SQL = Sample quantitation limit.

UJ = The reported quantitation limits are qualified estimated.

µg/kg = Micrograms per kilogram (equivalent to parts per billion or ppb).

Note: The precision of the entries in the "Comments" column is governed by the rules of significant digits.
[5,6,7,8]

4,4'-DDD was detected in one sediment sample, SD-04, at a concentration of 1.2 times the SQL but was not detected in any source samples. Chromium was detected in one sediment sample, SD-06,

at a concentration of 3.4 times the reference concentration; chromium was detected in one soil sample collected by EWR and analyzed by EP toxicity methods at elevated concentrations. Chromium was not detected in any soil samples collected by CDM Federal at elevated concentrations. Mercury was detected in two sediment samples, SD-02 and SD-04, at concentrations of 1.1 and 1.3 times the sample detection limit. Mercury was not, however, detected in sample SD-03, the duplicate of SD-02. Mercury was detected in two source samples collected by CTDEP and in two source samples collected by CDM Federal [5,6,7,8,12,26]. The perimeter of the wetland between SD-02, which is closest to the PPE, and SD-04 equals approximately 2,500 feet [3].

It is not known if any of the above compounds/analytes detected in the CDM Federal sediment samples were used or generated at the facility. The presence of the pesticide 4,4'-DDD in one sediment sample is presumably the result of routine application prior to 1972, which is when EPA banned its use; however, due to its persistent nature, it may still be present at low concentrations [38].

SOIL EXPOSURE PATHWAY

Access to the Carbolabs property is unrestricted. There are 11 full-time and two part-time employees at Carbolabs. The nearest residence is located approximately 300 feet south of the property [3,26]. There are no schools or day-care centers located on the property and within 200 feet of contamination [3]. There are no known terrestrial sensitive environments on the property [3,24]. Approximately 982 people live within 1 mile of the property [13].

Carbolabs was inspected by CTDEP on June 25, 1980. The inspection report stated "there is a historical possibility of relatively small quantities of various chemicals being dumped on the ground out back in the past." The inspection report also noted that approximately 1,000 pounds of neutralized waste hydrochloric acid (HCl) are generated per year and dumped on the ground in the back of the property [26].

In June 1989, following a fire that occurred on the property, EWR collected 21 soil samples from the Carbolabs property (see Figure 3: Site Sketch with EWR Soil Sampling Locations). The samples were analyzed for VOCs, EP toxicity metals, and cyanide. Methylene chloride, 1,2-dichlorobenzene, barium, chromium, copper, lead, and zinc were detected in at least one sample [12]. See the Waste/Source Sampling section of this report for details of the sampling event.

On August 23, 1995, CDM Federal collected six surface soil samples, including one reference sample and one duplicate, from the Carbolabs property (see Figure 4: Site Sketch with CDM Federal Soil Sampling Locations). All samples were analyzed for the full TAL and TCL using a CLP laboratory [3,5,6]. Calcium, copper, lead, mercury, and zinc were detected in at least one sample at concentrations either above the sample detection limit or at least three times above the reference concentration [5,6]. See the Waste/Source Sampling section of this report for details of the sampling event.

AIR PATHWAY

The nearest potential receptors of airborne hazardous substances are the employees of Carbolabs. The nearest residence is located approximately 300 feet south of the property [3,26]. As shown in Table 15, an estimated 27,256 people live within 4 miles of the property [13].

TABLE 15

**Estimated Population within 4 Miles of
Carbolabs Inc.**

Radial Distance from Carbolabs Inc. (miles)	Estimated Population
0.00 - 0.25	62
> 0.25 - 0.50	177
> 0.50 - 1.00	743
> 1.00 - 2.00	2,735
> 2.00 - 3.00	9,360
> 3.00 - 4.00	14,179
TOTAL	27,256

[13]

Sensitive environments within a 4-mile radius of Carbolabs are listed in Table 16.

TABLE 16**Sensitive Environments Located
within a 4-mile Radius of Carbolabs Inc.**

Species Name	Distance from Property	Status
Early Coralroot	0 to 0.25 mile	State Threatened
Dwarf Huckleberry	0 to 0.25 mile	State Threatened
Acidic Atlantic White Cedar	0 to 0.25 mile	Unknown
Pod Grass	0.25 to 0.5 mile	State Endangered
Pitcher Plant Moth	0.25 to 0.5 mile	State Special Concern
Poor Fen	0.25 to 0.5 mile	Unknown
GA Geometer Moth	0.25 to 0.5 mile	State Special Concern
Bog Copper	0.25 to 0.5 mile	State Threatened
Mountain Spleenwort	3 to 4 miles	State Threatened
Virginia Snakeroot	3 to 4 miles	State Threatened
Eastern Prickly Pear	3 to 4 miles	State Special Concern
American Ginseng	3 to 4 miles	State Special Concern
Torrey Mountain-Mint	3 to 4 miles	State Endangered
Godies Fern	3 to 4 miles	State Threatened
Long-Awn Hairgrass	3 to 4 miles	State Endangered

[24]

In addition to the above-named sensitive environments, there are approximately 487 acres of wetland located within 4 miles of Carbolabs [33,34]. The Naugatuck State Forest is located approximately 1.5 miles north and northwest of Carbolabs [33].

Following the fire of June 19, 1989, on the property, EWR collected two air samples on June 30, 1989, from the building in which the fire occurred to determine if the building could be entered without respiratory protection. One sample was collected with an air pump containing a charcoal tube, and the other was collected with a 3M organic vapor monitor. Both samples were analyzed for VOCs only [26]. The analytical results of this air sampling activity are presented in Table 17.

TABLE 17

**Summary of Analytical Results
Air Sample Analysis for Carbolabs Inc.
Collected by EWR on June 30, 1989**

Compound	Concentration from Charcoal Tube (results given in mg/m ³)	Concentration from 3M Vapor Monitor (results given in mg/m ³)
Acetone	0.0055	0.068
Benzene	ND (0.0002)	ND (0.04)
Chloroform	0.0005	0.886
1,2-Dichlorobenzene	ND (0.0002)	ND (0.04)
Ethyl acetate	0.0166	0.634
Methylene chloride	ND (0.0002)	0.493
Toluene	0.0098	0.538

mg/m³ = milligrams per cubic meter.

ND = Not detected.

The number in parenthesis is the detection limit for the compound analyzed.

[12]

No air sampling was conducted as part of this SIP. Air monitoring for detections of VOCs was performed during the June 23, 1995 onsite reconnaissance and during the August 23, 1995 sampling event. The instrument used during the site reconnaissance was an organic vapor monitor (OVM) 580B equipped with an 10.6 eV lamp. No readings above 0 ppm were detected during the site reconnaissance. Two OVMs, both equipped with 11.8 eV lamps, were used during the sampling activities. No sustained readings above 0 ppm were detected during the sampling activities [3,4].

SUMMARY

Carbolabs Inc. (Carbolabs) is located at 443 Fairwood Road in Bethany, New Haven County, Connecticut (Latitude 41° 26' 39" N, Longitude 72° 59' 26" W) and manufactures organic chemicals that are used for experimental and research purposes. The property consists of 2.05 acres. Carbolabs is an active facility and has been operating at this location since 1968.

Spent ethyl acetate solvent was originally stored onsite in three 1,000-gallon aboveground tanks. Carbolabs Inc. had stopped using these tanks by 1980. The empty tanks were removed between 1989 and 1990. Currently, Carbolabs Inc. generates approximately 1,000 pounds of waste ethyl acetate per year. Drums of waste ethyl acetate and other chemical wastes, including 16-gallon labpacks, are temporarily stored in a chemical storage trailer. The wastes are currently picked up by Clean Harbors, Inc., a licensed hazardous waste transportation and disposal facility. Carbolabs has used a hazardous waste transportation and disposal facility to remove and dispose of its hazardous wastes since at least 1979. Non-hazardous scrubber saltwater is presently collected in a 3,000-gallon aboveground tank located in the main building. The tank is emptied approximately three times a year by Clean Harbors, Inc.

In 1979, the Connecticut Department of Environmental Protection (CTDEP) collected a sludge sample from one of Carbolabs Inc.'s 1,000-gallon aboveground waste ethyl acetate storage tanks. Several volatile organic compounds (VOCs), metals, and cyanide were detected at elevated concentrations.

In 1980, Carbolabs was inspected by CTDEP, which noted that approximately 1,000 pounds of neutralized waste hydrochloric acid are generated per year. The acid is neutralized in 20-gallon batches using 50 percent sodium hydroxide and then is dumped on the ground behind the building.

It was originally presumed that drains from the bathroom emptied into the septic tank, which is currently used, while laboratory sink and other equipment drains emptied into an onsite subsurface drywell. However, in 1989, Environmental Waste Resources, Inc. (EWR) attempted to collect samples from the drywell and discovered that it did not exist. All drains emptied into the septic tank located northeast of the laboratory building.

During an inspection by CTDEP in 1987, two unpermitted discharges to the ground were identified. First, approximately 40 gallons of air scrubber wastewater were being discharged to the drywell each month. It was later discovered that no drywell ever existed on the property; the discharge was actually going to the septic tank. The air-scrubber wastewater was neutralized with hydrochloric acid prior to being discharged. Second, non-contact cooling water used in the vacuum distillation process was also being discharged to the septic tank at a rate of approximately 2 gallons per minute. As a result of this inspection, Carbolabs agreed to start collecting the air scrubber wastewater and have it disposed of by its hazardous waste transporter. The CTDEP inspectors also recommended that CTDEP require Carbolabs Inc. To obtain a permit for its non-contact cooling water discharge. Available information does not indicate whether these corrective actions were carried out.

On June 19, 1989, a fire occurred at Carbolabs. EWR was contracted by CTDEP to conduct an emergency cleanup of the property. As part of the cleanup, EWR collected 21 soil samples, installed

three monitoring wells, and collected groundwater from these three wells, as well as groundwater from the two drinking water wells already existing on the property. Two air samples were also collected from the main laboratory building. Methylene chloride, 1,2-dichlorobenzene, barium, chromium, copper, lead, and zinc were detected in at least one of the soil samples. Tetra-chloroethylene, 1,2-dichloroethane, xylenes, benzene, methyl isobutyl ketone, barium, copper, lead and zinc were detected in at least one groundwater sample. Several VOCs were detected from the air samples.

In June and July 1989, CTDEP collected two soil samples from the property, a surface water sample from a nearby wetland, tap water samples from several private wells nearby, and a pool water sample from the pool of a nearby resident. Cyanide and several metals were detected in the soil samples at elevated concentrations.

On June 23, CDM Federal Programs Corporation (CDM Federal) performed an onsite reconnaissance of Carbolabs Inc. On August 23, 1995, CDM Federal collected seven soil samples from the property and six sediment samples from Bethany Bog, the nearby wetland. Calcium, copper, lead, mercury, and zinc were detected in at least one soil sample at concentrations significantly above the reference concentration. Aluminum, chromium, and mercury were detected in at least one sediment sample at concentrations significantly above the reference concentration.

The nearest private wells from the property are the two wells located on the Carbolabs Inc. property, approximately (b) (9) in front of or (b) (9) of the main laboratory. These wells serve the 13 workers of Carbolabs Inc. The nearest public wells are the Gendron Valley Mobile Park well system and the Mark's Brook well system, both located (b) (9) of the property. The Mark's Brook well system is supplied by the Connecticut Water Company, Naugatuck Division. Other public drinking water sources within 4 miles of the property include the Indian Field well system and the Harmony Acres Mobile Home well system. An estimated 14,947 people are served by private and public drinking water sources within 4 miles of the Carbolabs property. There are no wellhead protection areas within 4 miles of the property.

The nearest surface water body and probable point of entry is Bethany Bog, a 55-acre wetland, which is located approximately 500 feet northwest from the Carbolabs Inc. property boundaries. Surface water flow for most of the property is also directed to Bethany Bog. The 15-mile downstream surface water pathway consists of Bethany Bog for 1 mile, Hockanum Brook for 3 miles, the Naugatuck River for 9.5 miles, and the Housatonic River for the remaining 1.5 miles. Approximately 4.1 miles of wetland frontage exist along the 15-mile surface water pathway. There are no known sensitive environments or drinking water intakes along the surface water pathway. Fisheries exist in Hockanum Brook, the Naugatuck River, and the Housatonic River.

There are 11 full-time and two part-time employees at Carbolabs Inc. The nearest residence is located approximately 300 feet south of the property. Approximately 982 people live within 1 mile of the property. There are no schools or day-care centers within 200 feet of the property. There are no known terrestrial sensitive environments on the property. An estimated 27,256 people live within 4 miles of the property. Sensitive environments within 4 miles of Carbolabs Inc. include habitats for six state-designated threatened species, three state-designated endangered species, and four state-designated special concern species.

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ATTACHMENT A

Carbolabs Inc.

**Routine Analytical Services
Organic Analytical Results and Sample Quantitation Limits
CDM Federal Programs Corporation**

Collected on August 23, 1995

ATTACHMENT B

Carbolabs Inc.

**Routine Analytical Services
Inorganic Analytical Results and Sample Detection Limits
CDM Federal Programs Corporation**

Collected on August 23, 1995

ATTACHMENT C

Carbolabs Inc.

**Delivery of Analytical Services
Organic Analytical Results and Sample Quantitation Limits
CDM Federal Programs Corporation**

Collected on August 23, 1995

ATTACHMENT D

Carbolabs Inc.

**Delivery of Analytical Services
Inorganic Analytical Results and Sample Detection Limits
CDM Federal Programs Corporation**

Collected on August 23, 1995